CLAIMS

We claim:

1. A microbolometer circuit comprising:

a first microbolometer;

a variable resistor coupled to the first microbolometer; and

a biasing circuit coupled to the first microbolometer or the variable resistor to provide a load current.

2. The circuit of Claim 1, wherein the biasing circuit comprises a second microbolometer.

3. The circuit of Claim 2, further comprising an amplifier coupled at a node between the first microbolometer and the second microbolometer for providing an output signal from the microbolometer circuit

4. The circuit of Claim 2, further comprising a transistor, coupled between the first microbolometer and the second microbolometer, for biasing the amount of current flowing through at least one of the first microbolometer and the second microbolometer.

5. The circuit of Claim 4, further comprising a variable voltage source coupled to a gate terminal of the transistor and controlling the biasing of the transistor.

6. The circuit of Claim 4, further comprising a first amplifier coupled to a gate terminal of the transistor, wherein the amplifier is responsive to a reference voltage to control the transistor.

7. The circuit of Claim 6, further comprising a digital-to-analog converter providing the reference voltage.

8. The circuit of Claim 1, wherein the variable resistor is calibrated over a range of temperatures to compensate for a temperature coefficient of resistance difference between the first microbolometer and the biasing circuit.

9. The circuit of Claim 2, further comprising a resistor coupled to the second microbolometer, the resistor calibrated to adjust a temperature coefficient of resistance of the second microbolometer.

10. The circuit of Claim 3, further comprising a variable voltage source coupled to the amplifier to provide a voltage reference level.

11. The circuit of Claim 1, further comprising a first voltage source coupled to the first microbolometer to bias the first microbolometer.

12. The circuit of Claim 11, further comprising a second voltage source coupled to the biasing circuit.

13. The circuit of Claim 2, further comprising:

a first transistor coupled to the first microbolometer to control the amount of current flowing through the first microbolometer; and

a second transistor coupled to the second microbolometer to control the amount of current flowing through the second microbolometer.

14. The circuit of Claim 13, further comprising a first variable voltage source coupled a gate terminal of the first transistor and a second variable voltage source coupled to a gate terminal of the second transistor.

15. The circuit of Claim 13, further comprising a transimpedance amplifier coupled between the first and second transistor.

16. A microbolometer circuit comprising:

a first microbolometer;

a current source coupled to the first microbolometer;

a second microbolometer coupled to the first microbolometer; and

an amplifier coupled to a node between the first microbolometer and the second microbolometer to provide an output signal from the microbolometer circuit.

17. The circuit of Claim 16, wherein the current source is calibrated to compensate for a temperature coefficient of resistance difference between the first microbolometer and the second microbolometer.

18. The circuit of Claim 16, further comprising a resistor coupled to the second microbolometer, the resistor calibrated to adjust a temperature coefficient of resistance of the second microbolometer.

19. The circuit of Claim 16, further comprising at least one transistor coupled between the first microbolometer and the second microbolometer to control the amount of current flowing through the microbolometer circuit.

20. The circuit of Claim 16, further comprising a first voltage source coupled to the first microbolometer to bias the first microbolometer.

21. The circuit of Claim 20, further comprising a second voltage source coupled to the second microbolometer.

22. A two-dimensional array comprising a plurality of microbolometer circuits according to Claims 1 or 16.

23. A microbolometer focal plane array comprising:

an array of microbolometer cells, each containing a first microbolometer; and

a temperature compensation circuit associated with each microbolometer cell, each temperature compensation circuit comprising a variable resistor.

24. The circuit of Claim 23, wherein the temperature compensation circuit further comprises a second microbolometer coupled to the variable resistor.

25. The circuit of Claim 23, wherein the variable resistor is calibrated to compensate for a temperature coefficient of resistance difference between the first microbolometer and the second microbolometer.

26. The circuit of Claim 23, further comprising an amplifier coupled to at least one of the first microbolometer and the temperature compensation circuit to provide an output signal.

27. The circuit of Claim 26, further comprising a reference circuit coupled to the amplifier to provide a reference voltage.

28. The circuit of Claim 26, further comprising a processor coupled to the amplifier to receive the output signal.

29. The circuit of Claim 28, wherein the processor is coupled to the microbolometer focal plane array to provide input signals to control each of the temperature compensation circuits.

30. The circuit of Claim 29, wherein the processor sets the value of the variable resistor corresponding to each microbolometer cell.

31. The circuit of Claim 24, wherein each temperature compensation circuit comprises at least one transistor coupled to the second microbolometer to control the amount of current flowing through the second microbolometer.

32. The circuit of Claim 31, further comprising a variable voltage source coupled to a gate terminal of the transistor.

33. The circuit of Claim 24, further comprising a resistor coupled to the second microbolometer to adjust a temperature coefficient of resistance of the second microbolometer.

34. The circuit of Claim 24, further comprising a first voltage source coupled to each of the first microbolometers to bias the first microbolometers.

35. The circuit of Claim 34, further comprising a second voltage source coupled to each of the second microbolometers.

36. A method of calibrating a microbolometer detector circuit, the method comprising:

calibrating a first variable resistor to compensate for a relative temperature coefficient of resistance between an active microbolometer and a load over a desired temperature range; and

calibrating an offset for an output signal generated by the microbolometer detector circuit.

37. The method of Claim 36, wherein the load comprises a reference microbolometer.

38. The method of Claim 37, further comprising calibrating a resistance value for a second resistor to adjust a temperature coefficient of resistance for the reference microbolometer.

39. The method of Claim 36, further comprising calibrating a fine correction to the output signal over the desired temperature range.

40. The method of Claim 39, wherein the fine correction calibration comprises a polynomial that generates an offset to the output signal based on a temperature of the microbolometer detector circuit.

41. The method of Claim 36, further comprising calibrating a uniform gain to the output signal over the desired temperature range.

42. The method of Claim 41, further comprising calibrating an additional offset to the output signal over the desired temperature range.

43. A method of detecting the level of incident infrared radiation, the method comprising:

providing an active microbolometer to receive the infrared radiation;

applying a voltage potential to the active microbolometer;

providing a reference microbolometer to provide a reference relative to the active microbolometer;

providing compensation for a temperature coefficient of resistance difference between the active microbolometer and the reference microbolometer over a certain temperature range; and

generating an output signal based on a change in resistance of the active microbolometer due to the received infrared radiation level.

44. The method of Claim 43, wherein the compensation provided for the temperature coefficient of resistance comprises a variable resistor whose value is calibrated over the temperature range.

45. The method of Claim 43, wherein the compensation provided for the temperature coefficient of resistance comprises a current source, for the active microbolometer, whose value is calibrated over the temperature range.